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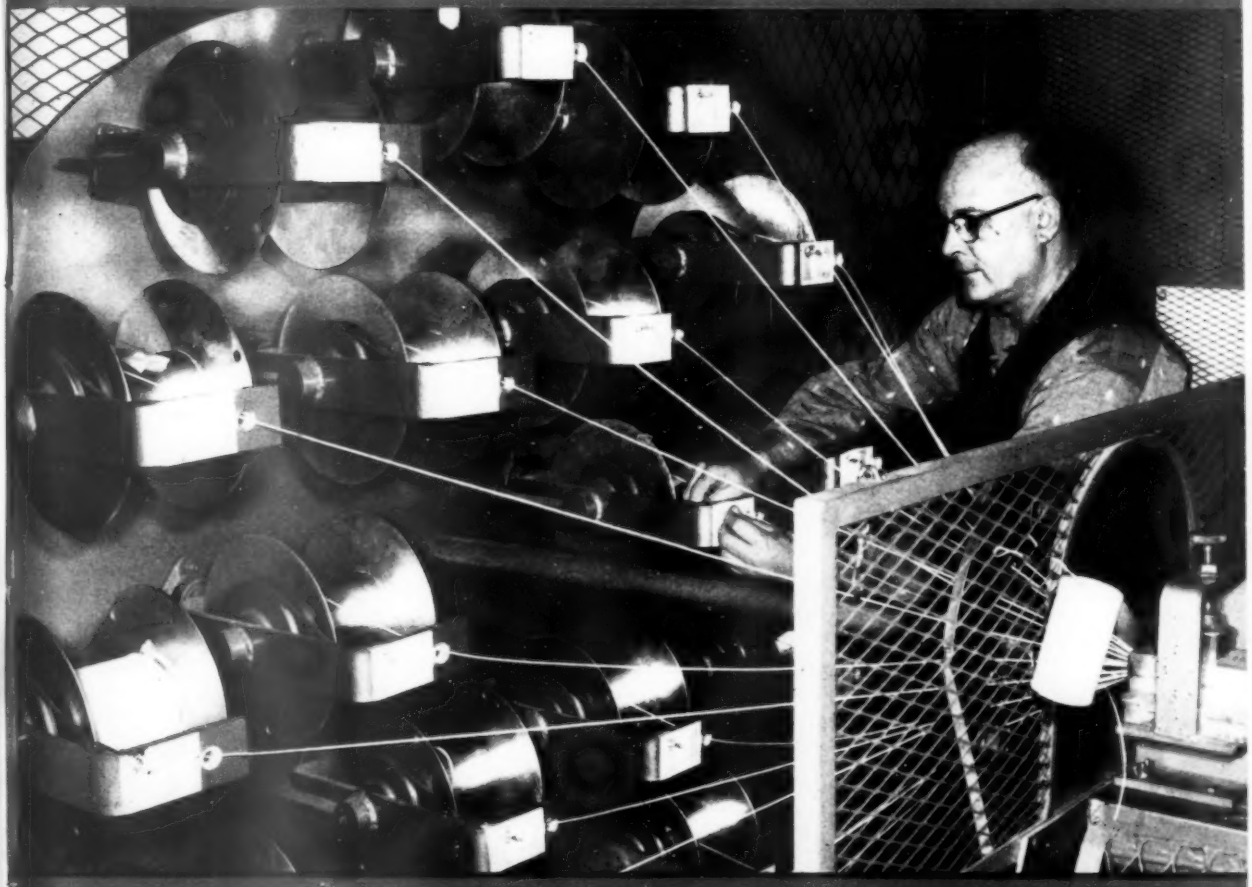
SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE



Space Age Spinning
See page 302

A SCIENCE SERVICE PUBLICATION

ASTRONAUTICS

What Astronaut Feels

As SCIENCE NEWS LETTER *goes to press the astronaut is being readied for the first U. S. manned space shot. If successful, the following story tells what he will experience.*

At the time of blast-off the astronaut is lying down inside the Mercury capsule on top of a Redstone missile, strapped into the astronaut's couch constructed of crushable honeycomb material to fit his body exactly.

As the Redstone lifts off the launching pad at the zero hour, he checks the flight timer on the instrument panel to see if it has begun to operate. If it has not, he must actuate the clock start button and announce "clock operating."

Then as the rocket shoots into flight a tremendous pressure begins to push him into his couch giving the feeling of weighing between 1,500 and 2,000 pounds. It feels as if he were being smashed, and he has trouble seeing anything.

Thirty seconds after "lift-off" and every 30 seconds after that until free fall (when weightlessness sets in), he reports on his control-system fuel supply, the amount of the earth's gravitation experienced, the angle of the rocket in flight, the cabin pressure and the oxygen supply.

The first U. S. astronaut is not just a spectator watching the view as was the first Russian cosmonaut. He has been trained to work.

In two minutes and 15 seconds, the Redstone engines cut off and the escape tower is cast off. The astronaut then fires a cluster of three small rockets and the space capsule is pushed away.

If the space capsule, which looks like an oversized child's top, begins to oscillate as it is released from the Redstone, an automatic pilot steadies it. The capsule's pilot periscope, which shows the earth's curvature at the highest altitude, now is extended into space.

The Mercury astronaut reports all factors to a control center on earth.

Weightlessness sets in when the rockets cut off. Instead of feeling pinned down in the couch, the astronaut now feels light as air. He is strapped down for safety reasons. Fifteen seconds after engine cut-off, turn-around starts.

Now, instead of facing forward, the automatic pilot causes the craft to make a half-circle turn so the flat end of the "top" faces forward and the astronaut rides backwards for the rest of the scheduled 290-mile trip.

The astronaut handles the control stick to find out just how well he can do the job while weightless. Every motion he makes will be sent back to earth by telemetry. He actually takes control of the capsule and tries to manipulate it under weightless conditions, where everything not strapped down floats.

After four minutes of flight, the astronaut begins to use the earth periscope and report what he sees and what checkpoints are visible from more than 100 miles above the earth.

The entire flight lasts about 15 minutes. The astronaut "sees" the earth three ways: through a porthole, by periscope and by instruments. After about seven minutes of flight the capsule begins reentry flight with the blunt end down so the astronaut lands on his back, considered the safest landing position.

The telescope is retracted. He operates some of the 127 switches, dials, buttons and fuses to find out if he can do it as well as he did on becoming weightless.

Shortly afterwards, he hits the fringe of the earth's atmosphere and reports how much the gravitation from the earth increases.

Soon the 63-foot red and white parachute opens at the narrow end of the "space top" and before long the capsule is spotted by waiting ships and aircraft.

After landing in the ocean, the astronaut has the choice of staying inside the capsule until he is on board ship or he can open the capsule hatch, inflate a raft and be picked up by helicopter. In either case, he is the most celebrated man ever to return to the U. S.

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AERONAUTICS

Planes With Vertical Lift Will Be Future Air Buses

➤ PLANES with a vertical lift will be flying buses, carrying air-traveling commuters from city to regional airports, by the late 1960's, Peter G. Kappus, General Electric designer, predicted.

The aircraft having the vertical take-off and landing (VTOL) propulsion systems now under development will alter the size, shape and use of airports in the near future. The VTOL is the answer to problems such as air and ground congestion and disturbing noise levels.

Use of VTOL will make it possible for jet airports to be placed 50 to 100 miles from a city. A short-range VTOL could cover such a distance in 15 to 20 minutes carrying 80 to 100 passengers.

V-ports located at business and population centers would handle helicopters and VTOL airbus traffic. Future city planning should give consideration to "this great new breakthrough in aviation," Mr. Kappus told the Tinker Society of Professional Engineers and Scientists in Oklahoma City.

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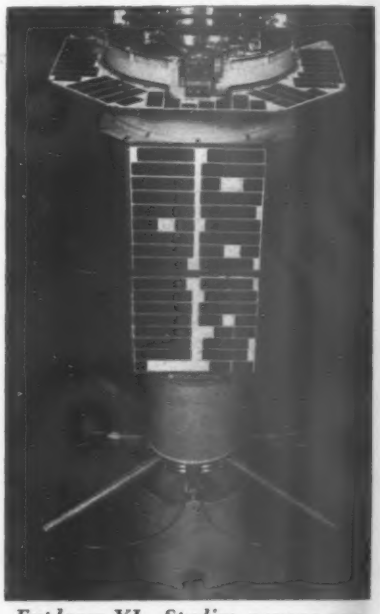

Explorer XI—Studies gamma rays

ROCKETS AND MISSILES

Launch Space Observatory

➤ THE FIRST astronomical observatory ever launched into space—a United States achievement—is contained in the Explorer XI satellite now circling the earth. The gamma-ray telescope of Explorer XI is designed to detect and measure cosmic gamma radiation in space. Gamma rays are believed to hold the secrets about the elements making up the universe, including the earth.

The observatory-satellite will be able to "map" distribution of gamma rays both in the Milky Way galaxy of the sun and its planets and in neighboring systems, such as the Magellanic Clouds. Scientists have difficulties studying these space gamma rays from earth because of radiation in the earth's atmosphere.

Very fast and very small nuclear particles, protons, bombard the earth's atmosphere from space. The earth's magnetic field turns aside the protons, which scatter and interact with particles of the atmosphere, resulting in the production of gamma rays.

Scientists believe the same process takes place in space. Balloon flights have shown that interference from earth's radiation is so strong the only way to find out is to study the reactions from above the earth's main atmosphere, as Explorer XI is now doing.

The 82-pound satellite resembles an old-fashioned street light. It consists of a 12-inch diameter octagonal aluminum box 23½ inches long mounted on a six-inch-diameter aluminum instrument column 20½ inches long. Once in space the satellite's instruments are powered by solar cells. In its orbit, the satellite tumbles end over end ten times every minute. This enables the telescope to scan part of the surrounding space every six seconds.

Explorer XI was launched from Cape Canaveral April 27, at 9:16 a.m. EST. The satellite went into orbit and sent signals back to earth by telemetry as planned.

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ASTRONAUTICS

Giant Space Shot Effort

Thousands of man years and millions of tests went into the first U. S. manned space shot. The space capsule was recovered more than 5,000 times, Tove Neville reports.

➤ THOUSANDS of man years and millions of tests went into the first United States manned shot into space.

Some items in the Mercury capsule, the vehicle for the first U. S. astronaut, were tested more than 10,000 times. Among these are transistors and relays tested for shock and vibration, the National Aeronautics and Space Administration told SCIENCE SERVICE. The capsule contains seven miles of electric wires.

Twenty-five systems, such as escape, communication and recovery systems, are contained in the capsule that is the result of development and tests taking four and a half years, starting with the testing of nose cones. The capsule has cost about $2,000,000 a week. In the summer of 1958 the astronaut's couch was developed and tested under a gravitational pull of 25 times that of the earth.

More than 70 models of the capsule were tested in wind tunnels for a total of more than 5,000 hours. This is more testing than any aircraft or missile warhead has ever had.

The astronaut has been trained in ten trainers under all conditions similar to those in space, except that of being weightless. His pressure suit was developed from a Navy suit used for flying at altitudes of 50,000 to 60,000 feet.

More than 2,000 contractors and suppliers did work on or for Project Mercury.

Eighteen tracking stations were built by NASA around the world to track the Mercury capsule while in flight, both on its downrange 290-mile trip and later orbital flights.

The tracking stations will be in contact with the man in the Mercury capsule. The stations can talk to the astronaut as he passes over and he can report back to them conditions in the capsule.

All information from the stations goes to the control tracking center at Cape Canaveral by radio waves, which travel at the speed of light (186,000 miles a second). If any calculations are necessary, the information goes to Goddard Space Flight Center, Greenbelt, Md., where computing will be done and from where answers will be sent back to Cape Canaveral, which then sends the information to the astronaut in space.

The Navy's recovery program of the Mercury capsule has included the training of personnel for 5,000 pick-ups of the capsule in the ocean, without one failure. The capsule was dropped off Norfolk, Va., and the recovery crews told to "go find it."

The crews knew only that it was out there somewhere in an area 75 miles wide and 250 miles long.

Several dozen scale models of the Mercury capsule were tested at the Wallops Island, Va., test site to find how pressure and heat influenced the capsule. Following that, seven Little Joe boosters with experimental capsules were fired and tested at the same site.

At Cape Canaveral one Big Joe booster with an experimental capsule was fired for testing. Three Atlas and three Redstone rockets were also test-fired there for the Mercury project.

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ROCKET TESTER—Largest rocket engine test stand in the West is nearing completion at Edwards Rocket Site, Calif. Built by Rocketdyne, Canoga Park, Calif., it will test 1,500,000-pound-thrust engine now under development.

PHYSICS

Magnetic Wire May Help Power From Fusion

➤ A NIOBIUM-TIN wire can be used to make permanent magnets and make the dream of electric power from controlled nuclear fusion more likely.

Drs. Charles E. Roos of Vanderbilt University, Nashville, Tenn., and George Kneip of Oak Ridge National Laboratory, Oak Ridge, Tenn., reported to the American Physical Society meeting that this material can carry ten times as much current as previous measurements indicated. A niobium-tin superconductor allows a current to flow indefinitely, and seemingly without resistance.

The niobium-tin alloy was developed at Bell Telephone Laboratories.

At temperatures more than 400 degrees below zero Fahrenheit, the wire will provide a method of maintaining very high magnetic fields without energy. It will also be useful in ion space propulsion after a space vehicle has entered outer space. The niobium-tin wire will also be extremely important in studies leading to control of thermonuclear reactions and in bubble chambers used in experiments with nuclear particles.

High magnetic fields are used in research on thermonuclear reactions to confine the extremely hot gases, since the gases would dissipate if they touched the walls of a container.

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GENETICS

Mutations From X-Rays

➤ EVEN THE SMALLEST doses of X-rays produce mutations, studies involving more than a million fruit flies have shown.

Dr. Bentley Glass and Rebecca K. Ritterhoff of Johns Hopkins University, Baltimore, Md., reported to the National Academy of Sciences spring meeting in Washington, D. C., that a five-roentgen dose of X-rays causes an increase in mutations in the fruit fly. This is the lowest radiation dose ever studied in any animal with respect to mutations, the previous record being 25 roentgens for fruit flies and 37 and one-half for mice.

To show the mutagenic effect of the five-roentgen dose, Dr. Glass said, 41 experiments were completed. All the tests were blind, meaning that the persons who examined the 1,172,145 fruit flies did not know which had been X-rayed and which had not.

Among the X-rayed flies, 328 mutations appeared, while only 289 appeared in controls. This difference, he said, is slightly greater than predicted from damage done by higher radiation doses, and the chances that the increased rate among X-rayed flies occurred by chance are between four and eight in 100.

There was also a small but significant drop in the number of offspring produced by the irradiated parents, Dr. Glass reported. This amounted to a 1.4% reduction.

Five roentgens is the radiation dose a human would get in about 10 chest X-ray exposures. Most of this, however, would be received by the chest area and only one or two ten-thousandths roentgens per exposure would be received by the reproductive tissues.

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MEDICINE

High Blood Pressure Risk Greatest in Young Men

➤ RISK OF DEATH from high blood pressure is greater among men patients 15 to 39 years old than among those 40 to 69.

Dr. Richard S. Gubner of the Equitable Life Assurance Society of the United States told a symposium on recent advances in hypertension in Philadelphia that hypertension most commonly begins relatively early in adult life.

By the time such patients apply for life insurance, Dr. Gubner said, it is assumed that they have had high blood pressure for many years.

"They may be considered to represent the relatively hardy survivors in whom cardiovascular complications have been and continue to be less apt to develop."

Dr. Gubner said this idea is illustrated in the fact that malignant hypertension is typically seen in the early adult decades rather than in later life.

"Presumably if the constitutional predisposition to hypertension is high," he said, "the more severe complications will become manifest sooner rather than later if these are apt to appear."

He also said that young overweight persons have a higher death rate than older persons who are obese.

Dr. Gubner based his report mainly on material in the 1959 Build and Blood Pressure Study of the Society of Actuaries, which contains the pooled experience of 26 American and Canadian insurance companies, involving 3,900,000 lives and 102,000 deaths.

Hahnemann Medical College and Hospital, Philadelphia, sponsored the symposium.

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BIOCHEMISTRY

Nucleic Acids Cancer Clue

➤ A MAJOR KEY to solving the cancer problem is seen in studies of the relationship between human cells and infective nucleic acids taken from viruses by Dr. Joseph Huppert, head of research at the Pasteur Institute, Paris.

Dr. Huppert, who is presently collaborating on studies on cancer viruses and their nucleic acids at Sloan-Kettering Institute, New York, was the first to report causing tumors in mice using nucleic acid taken from a virus found in human cancers.

A normal cell has a complicated protective system and a specific amount of genetic information (its nucleic acids) to enable it to reproduce itself correctly at any given moment.

Wrong information may enter a cell by the introduction of a virus, but this does not mean, Dr. Huppert believes, that the virus will cause cancer. The important issue is whether or not the cell uses the information.

Only under the following circumstances can a cell use the wrong information, Dr. Huppert said:

1. When the cell divides. However, only a small percentage of cells in the body divide frequently.

2. In the presence of "trigger mechanism." The trigger mechanism can be introduced into a cell by many factors, including perhaps tumor viruses.

3. When a second virus of the non-cancerous variety such as influenza or vaccinia, the material of vaccine, is added to the cell.

This may result in the development of a new virus that may be injurious to the cell or may cause the cell to lose its normal controls.

Dr. Huppert emphasized, however, that in some cases, once a non-cancer-producing virus enters the cell, a substance is produced which prevents the viruses from growing in the cell. This substance has been isolated.

Certain viruses, said Dr. Huppert, will infect cells but will not produce more intact virus. They may, however, produce infective nucleic acid.

Recent studies of a small bacterial virus have demonstrated that the infective ability of its nucleic acid can be inhibited up to 90% by the addition of any other nucleic acid, including nucleic acid from mammalian cells, and can be stimulated by the addition of breakdown products of nucleic acid.

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AEROMEDICINE

Oneness With Universe

➤ WHEN AN ASTRONAUT gets out into space he should have a feeling of "oneness with the universe" just as Admiral Richard Byrd did when he spent four and a half months in the icy wastes of Antarctica.

In a report read to the Aerospace Medical Association meeting in Chicago, Capt. George W. Barnard, a psychiatrist at Wright-Patterson Air Force Base, Dayton, Ohio, said oneness with the universe was gained by identifying oneself with its order and not in a sense of being supported in a child-like way.

To defend themselves, the astronauts as well as others who have been thrown inward with their thoughts, must maintain an intellectual rather than emotional attitude toward what is going on around them.

Each person on a lonely mission in the past had a positive faith or hope that he could successfully complete the mission and return home to his loved ones, Capt. Barnard said.

Each was an independent, self-reliant person, flexible and able to adapt to a stressful situation. Even during times of crisis they did not panic and thereby put themselves into a position of being destroyed by a hostile environment.

Astronauts, like Byrd, may see mirages and unusual light reflections that they may interpret unrealistically. In space there will be no day-night cycle, and the spacemen will be in total darkness or total light. Fantasy must be avoided for fear of losing respect for harsh reality.

If astronauts cannot accept themselves under these strange conditions they may become anxious and overwhelmed so that they may make irrational and impulsive moves that would terminate their missions.

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Uncovered Arms in Space

➤ ASTRONAUTS who stick their hands and arms outside pressure suits in space can expect to have blisters, engorgement of veins, drying of skin and other disagreeable effects.

Capt. Charles L. Wilson, U. S. Air Force Aerospace Medical Center, Brooks AFB, Texas, reported to the Aerospace Medical Association in Chicago that tissue changes arose during exposure of unprotected parts to near-space-equivalent vacuum by 20 human volunteers.

Gas pockets appeared under the skin, but always disappeared when the low pressure chamber was repressurized.

Blood vessels contracted, causing a condition known as ischemia, and small spots were formed by effusion of blood. Edema of the hands and feet, in which abnormal fluids formed, also occurred.

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Eskimo Clothing Ideas

➤ LIGHTWEIGHT synthetic materials fashioned on Eskimo concepts of clothing have been developed in Canada for Arctic wear.

Military activity in Arctic winters has been seriously hampered by the weight and bulk of protective clothing, Squadron Leader S. E. Alexander of the Royal Canadian Air Force's Institute of Aviation Medicine, Toronto, reported at the Aerospace Medical Association meeting in Chicago.

New lightweight mukluks, similar to sealskin boots worn by Eskimos, have been designed, offering better protection at one-third the weight. Waterproof nylon fabric, treated with polyurethane, has been produced that cannot be penetrated by air but offers sufficient vapor diffusion to dissipate body moisture.

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TOOTH TO TELL CAUSE—Cross section of a baby tooth being studied by scientists at University of Illinois College of Dentistry, Chicago, Ill., to determine from growth rings and enamel the cause of certain handicaps of crippled children and the time the crippling agent occurred.

MEDICINE

Skin Cancer Surgery

➤ TO AVOID the spread of skin cancer in deeper tissue, surgery should be wide and deep, Dr. Richard D. Brasfield of Cornell University Medical College, New York, has reported.

Skin tumors may heal over the surface but continue spreading unless thorough surgical or X-ray treatment is given, Dr. Brasfield told the American Academy of General Practice meeting in Miami Beach, Fla.

Carcinoma of the skin is the most common type of cancer, the surgeon said. Men are more likely to have cancer of the exposed skin but women are equally susceptible in unexposed areas. Chronic exposure to the sun is the usual triggering factor.

The two types of skin cancer are basal cell carcinoma, usually a small nodule beneath the skin, and epidermoid carcinoma, marked by ulceration and infection.

Dr. Brasfield told his colleagues that they should watch for suspicious moles. Malignant melanomas, a rare group of highly lethal skin growths, usually develop from moles. Any tan, brown or black skin lesion that changes color, size or shape should be immediately suspected.

Although the family doctor will see thousands of moles during his total practice, he may see only as many as two melanomas, but surgical excision is the best treatment for such cases, the surgeon advised.

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Three "A's" for Youth

➤ ACCEPTANCE, affection and approval are the three "A's" that keep teenagers from becoming juvenile delinquents.

Telling teenagers that they are developing into lazy, worthless individuals is a push in the direction of anti-social behavior, Dr. Edward M. Litin, consultant in psychiatry at the Mayo Clinic, Rochester, Minn., told the American Academy of General Practice meeting in Miami Beach, Fla.

Another psychiatrist, Dr. George A. Constant of Victoria, Texas, said children who have not had the advantage of the three "A's" will have a "full warehouse of bad feelings." If they do not get rid of these emotions, the "warehouse" will come apart at the seams.

He said the physician has the major responsibility to teach parents the importance of the three "A's" in rearing their children.

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BIOLOGY

New Amino Acid Found

➤ A NEW AMINO ACID has been discovered by biochemists at the University of Cincinnati College of Medicine.

This is the first amino acid with a basically new structure to be discovered in more than 25 years. Only 20 other amino acids, the building blocks of protein, have been found in mammalian tissue since the first was described in 1810.

The new amino acid, tentatively designated as beta-hydroxyproline, was found in a collagen, the protein that makes up connective tissues such as tendons. It was found in the collagen of the Achilles tendon in cattle.

Announcement of the discovery was made in Atlantic City to the Federation of American Societies for Experimental Biology by Dr. James D. Ogle, Dr. Milan A. Logan and Ralph Arlinghaus of the University of Cincinnati College of Medicine.

The first clue to the existence of the new amino acid came, Dr. Ogle said, when a strange color reaction occurred during chromatographic separation, with an ion exchange resin, of a piece of the collagen molecule into its component amino acids.

"We got an amber-colored peak where no peak was expected. At first, we thought it was a mistake, but a repeat of the separation gave the same result."

The color of the peak, Dr. Ogle said, also suggested what the structure of the substance might be. It was neither red, the color expected for proline, nor colorless, the reaction expected for gamma hydroxyproline. It was amber—somewhere in between.

Dr. Ogle reported that the new amino acid probably is beta-hydroxyproline, structurally similar to gamma-hydroxyproline, but with the hydroxyl group in a different position.

The new amino acid makes up two-tenths to three-tenths of one percent of the particular collagen in which it was found. Gamma-hydroxyproline, by comparison, constitutes 10% to 12% of this collagen.

At present, Dr. Ogle said, no one knows what role the new amino acid plays or where else it is found.

"After we have synthesized it and verified its structure, we probably will look for it in other collagens and try to determine whether it is found in young or old, diseased or healthy animals. Right now all we know is that it is new."

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Rich Russian Overweight

➤ THE RICH RUSSIAN frequently is an overweight Russian, nutrition scientists attending the Federation of American Societies for Experimental Biology meeting in Atlantic City, N. J., learned.

Dr. F. E. Deatherage of the department of agricultural biochemistry at Ohio State University, Columbus, reported that the basic diet for Russia's 210,000,000 people, more than half of them rather poor, is bread and porridge.

Even those who can afford to pay the high cost of scarce food items such as meat, dairy products, food fats, fruits and vegetables do not rebalance their diets. They simply eat more bread and porridge, perhaps in more sophisticated form.

As a result, Dr. Deatherage said, "Obesity due to too much carbohydrate is not at all uncommon in higher income groups."

Russia, a country with half its people engaged in food production, is trying to solve its food problems in the same way it developed sputniks and armaments programs, Dr. Deatherage said, by putting its best scientific brains to work.

But shortages of certain foods make some of the program "inefficient and impractical" by American standards. For example, the Russians do not have the usual high yield raw materials for making edible oils. They make their oils from bone marrow, cherry seeds and grape seeds, all of which give low yield.

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Inherit Coffee Insomnia

➤ PEOPLE who drink one cup of coffee, then lie awake half the night, may have their ancestors to thank for their plight.

Susceptibility to caffeine could be genetically controlled, a professor of medicine and one of his students reported in Atlantic City, N. J. If this is true, addiction to drugs and alcohol also might have something to do with heredity.

The new theory linking heredity with caffeine insomnia was developed after Dr. Avram Goldstein and Richard Warren of the Stanford University School of Medicine, Palo Alto, Calif., tested coffee-drinking medical students.

During a period of years, 300 students were subjected to a "double-blind, placebo-controlled" test. After abstaining from coffee for at least 10 hours, students were given decaffeinated coffee that sometimes contained 150 milligrams of caffeine, the amount in a strong cup of coffee, and sometimes only lactose powder.

About 20% of the students always were kept awake by the caffeine but never by the placebo. Another 20% never were disturbed by either caffeine or placebo, and the others had variable reactions.

The researchers also reported to the Federation of American Societies for Experimental Biology that caffeine does not make a person dream any more often than usual. Although it may keep the person awake for a while and disturb the soundness of his sleep, it apparently does not make a sleep less refreshing.

Because some of the students always reacted to caffeine and some never did, the researchers thought that those who did not react might be absorbing caffeine into the blood much more slowly. But it was not so, both absorbed rapidly and completely.

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SOCIOLOGY

Religious Issue in Voting

▶ ALTHOUGH President Kennedy emerged the winner in the extremely close election in 1960, the fact that he is a Catholic cost him an estimated million and a half votes, a University of Michigan Survey Research Center team found in interviews with voters.

One out of every nine ballots cast in 1960 reflected a change from normal voting behavior due to the religious issue, the research team told a news conference in Washington, D. C.

The television debates helped Mr. Kennedy more than Mr. Nixon, the study revealed. Members of each party among the viewers responded favorably to their own candidate, but among independent voters, Kennedy ran two to one ahead of Nixon.

Dislike of former Secretary of Agriculture Benson and his farm policy did not turn out to give Kennedy very many votes because it happened that the farmers who were most anti-Benson were the same group who, as rural Protestants, were the most anti-Catholic.

The University of Michigan research team has been interviewing voters since the election campaign of 1948. A scientifically selected sample of more than 1,500 voters were questioned five times during the 1956, 1958 and 1960 elections.

People vote as they do because of basic predispositions such as party affiliation and the amount of their interest in politics and because of what the researchers call "short-term forces." In the election of 1952, the short-term forces included the Korean crisis, what the voters believed was a corrupt, "tired" party in power and the attractive personality of Mr. Eisenhower.

In 1960, the biggest of the short-term forces was the religious issue. This election had the highest proportion of late deciders since the 1948 election. Over one-third of the voters did not make their choice until the heat of the campaign.

Television was far more important in the 1960 election than it had been earlier. Voters saying that they paid attention to the campaign by watching television amounted to 87%. The figure in 1952 was only 53%.

The University of Michigan research team included Drs. Angus Campbell, Philip E. Converse, Warren E. Miller and Donald E. Stokes.

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RADIO ASTRONOMY

Signals From Space?

▶ RADIO ASTRONOMERS today might have more to go on in trying to receive intelligent signals from space if criticism had not discouraged a scientist in 1900.

Nikola Tesla, electrical engineer and inventor, told the world at that time he had received radio signals from space at his experimental station at Colorado Springs the year before.

He said these signals suggested "number and order," as if a system of communication was involved. He felt certain that the signals were not due to any of the known causes of radio signals, including auroras, or "northern lights," or earth currents.

Only later did the idea occur to him that the source of the signals might have intelligent extra-terrestrial control. However, when he said that one of the great possible achievements of the next hundred years might be to confirm and interpret this planetary challenge and was harshly criticized, he never gave detailed information about the results of his intended investigations and the chance reception of signals. Leland I. Anderson of Minneapolis reports in the current issue of the British journal Nature, 190:374, 1961, the experiences of Tesla, and thus has set off new speculation.

In Washington, D. C., SCIENCE SERVICE interviewed telephonically Dr. Frank Drake, a radio astronomer at the National Radio Astronomy Observatory in Green Bank, W. Va., who listened in on radio signals from space in the spring of 1960 in operating project OZMA sponsored by the National Science Foundation. At that time he used the 85-foot radio telescope for the studies of two stars, Tau Ceti and Epsilon Eridanus. These two stars are similar to the sun and thought possibly to have planets like the earth.

However, Dr. Drake did not record any radio signals from the vicinity of these stars that indicate a system of intelligent communication. He said that he plans in the future to listen in on space again and is now studying instrumentation "in order to do a better job of recording the radio noises the next time."

He said the U. S. Army has wax records of radio noises heard in the early 1920's at the time when Mars came close to earth in its travel around the sun. Dr. Drake said he has not been able to obtain these records, claimed to sound like intelligent signals, for study yet.

Marconi, the first to send radio signals, also reported hearing radio noises sounding like a system of communication similar to the Morse code.

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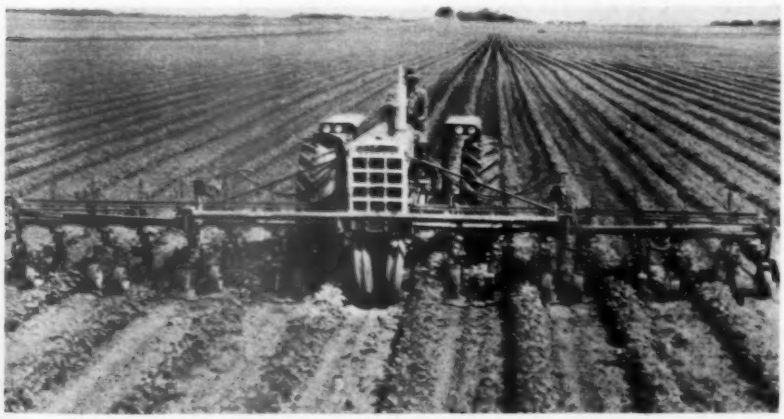

EIGHT-ROW-CULTIVATOR—Primarily used for soybeans and corn, a tractor-mounted cultivator, developed by Oliver Corporation of Chicago, handles eight rows instead of the usual four.

NATURAL RESOURCES

100 Million Cattle Added To World in Eight Years

▶ THE WORLD'S CATTLE and buffalo population has increased by 100 million in the last eight years, a figure which slightly exceeds the number found in the United States alone. This brings the present tally to more than a billion head, averaging roughly one animal for every three persons, the world over.

The U. S. Department of Agriculture, Washington, D. C., reports that beef and veal output in the 44 principal meat-producing countries has increased 17%, partly because meat-packing facilities are being improved in Africa, northern South America and Central America.

But demand for beef also has gone up sharply, as has the price, and in many countries, little beef is produced because cattle are used mainly for milk, for work, or as evidence of wealth.

A decrease of one percent in North American cattle is traceable to Cuba, where cattle numbers dropped by more than a million and a half. USDA indicates that this decline has taken place "where there have been widespread changes in farm ownership as big ranches have been taken over by collective organizations."

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AGRICULTURE

Exhaled Carbon Dioxide Helps Mosquito Zero In

➤ THERE IS ONE sure way to be less attractive to biting mosquitoes—stop breathing. Carbon dioxide, the chief gas exhaled in breathing, is a virtual homing beacon to mosquitoes, the U. S. Department of Agriculture has discovered.

In experiments aimed at finding a better insect repellant, entomologists C. N. Smith, I. H. Gilbert and H. K. Gouck of USDA's insect laboratory in Orlando, Fla., dressed a man in a lightweight diving suit and put him in a small room with three man-sized dummies and 300 *Aedes aegypti* mosquitoes, the kind that carries yellow fever.

The mosquitoes showed no preference for the man, whose breath was piped out of the room, until small amounts of carbon dioxide were released from a tank above his head.

Draping a cloth suit also made him more attractive to the mosquitoes as did uncovering his hands, regardless of carbon dioxide.

Exposing the face did not draw *A. aegypti*, but it did lure *A. taeniorhynchus*, a voracious biter found near salt marshes.

Such differences in preference also occur among flies, where different species prefer to bite cattle of different colors. Horse flies prefer red cattle to white ones, stable flies are most attracted to black cattle, a study showed.

Knowledge of this type, the entomologists report in Agricultural Research, May, 1961, could result in a repellant that does not actually repel, but rather masks the attractive factor.

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MEDICINE

Skin Diphtheria Spread By Returning Troops

➤ TROOPS RETURNING from foreign lands could cause an increase in skin diphtheria, now rarely found in the United States, physicians are warned in the Journal of the American Medical Association, 176:273, 1961. Skin diphtheria, which takes the form of ulcerated sores, can be cured by penicillin, but requires tests to differentiate it from similar-appearing skin diseases, Dr. Tobias R. Funt, Fort Lauderdale, Fla., reports.

Physicians also will be reading in the official journal:

Radioactive iodine has produced some striking improvement in 356 persons with overactive thyroid glands and some forms of heart disease.—Drs. Clement Delit, Solomon Silver, Stephen B. Yohalem and Robert L. Segal, Mount Sinai Hospital, New York (p. 262).

Blood pressure has been lowered in a group of patients with hypertension by the use of Marplan, or isocarboxazid, which has been found to be more potent than iproniazide, a similar drug. Both are called monoamine oxidase inhibitors (MAO) and are capable of blocking the activity of enzymes that alter blood pressure.—Drs. Marvin Moser, Bernard Brodoff, Hirsch Bakan and Aaron Miller of Montefiore Hospital, New York (p. 276).

Acute barbiturate poisoning, which continues to increase at an alarming rate (1,111 cases reported to the New York City Poison Control Center during 1958 alone), is usually better treated by supportive care than by stimulants such as caffeine, amphetamine and picrotoxin. Intake of alcohol with the barbiturate contributes to the depth of the coma but not to its duration, and no deaths occurred in patients who had taken both.—Drs. Joseph K. Dobos, Denver, Colo., and Drs. John Phillips and Gabriel A. Covo, Roosevelt Hospital, New York (p. 268).

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SURGERY

Special Anesthetic For Use in Antarctic

➤ HALOTHANE, a new anesthetic that can be administered with special apparatus under Antarctic conditions by a lay assistant, has been recommended for use by a British physician.

Dr. J. F. Nunn of the Royal College of Surgeons of England reported in the British Medical Journal, April 22, 1961, that convenient portable apparatus has been constructed for the safe use of halothane with oxygen. This apparatus requires no protection from extremes of temperature other than prevention of condensation within the vaporizer. Dr. Nunn said that an "intelligent layman" might be instructed to administer the anesthetic with the direction of the operating surgeon.

In the Antarctic, the most common operations are for appendicitis, strangulated hernia or perforated peptic ulcer. They must be performed in a hut, caboose or possibly a tent with open heating, where the temperature can be raised to at least 64 degrees Fahrenheit, Dr. Nunn said.

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GEOPHYSICS

Surface Electric Currents Come From Earth's Core

➤ ELECTRIC CURRENTS flowing at the surface of the earth probably come from the earth's core, two British scientists reported.

These currents were started by the same mechanism that created the earth's magnetic field, Dr. P. H. Roberts and Dr. F. J. Lowes of King's College, Newcastle-upon-Tyne, England, stated. Electric currents sent out into the mantle surrounding the core generate another current that can be measured at the earth's surface.

By conducting a survey of the electric current system at the earth's surface, much could be learned about the little known movements of the magnetic field deep in the earth's interior, they report in the Journal of Geophysical Research, 66:1243, 1961.

Earth currents have actually been measured for many years by geophysicists, but these currents originated primarily from sources near the earth's surface.

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IN SCIENCE

METEOROLOGY

100 Lightning Flashes Strike Each Second

➤ ABOUT 100 lightning flashes strike the earth each second throughout the world.

This average is based on the number of storms that strike different parts of the globe throughout the year, Dr. Robert C. Davis of the National Bureau of Standards reported at a joint meeting of the Institute of Radio Engineers and the U. S. National Committee of the International Scientific Radio Union in Washington, D. C.

Weather maps of the World Meteorological Organization indicating the storm activity in Europe, United States and other parts of the world and the amount of electric charge generated by thunder clouds were both used to arrive at the 100 per second figure.

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MEDICINE

Fever Caused By Body Hormones

➤ TEN HORMONAL by-products normally occurring in the human body can cause intense fever not due to bacteria, a group of University of Chicago scientists reported to the American Society for Clinical Investigation in Atlantic City, N. J.

Dr. Atallah Kappas, head of the research group, outlined in his paper a whole new class of substances to which attention is being called in explaining such fevers. Assisting Dr. Kappas were Dr. Robert H. Palmer and Dr. Paul Glickman.

The first clue in this field of fever research was uncovered by Dr. Kappas when he found that one by-product of the body's hormone metabolism, etiocholanolone, has a new biological action in fever production. This was a breakthrough in understanding fever.

Since then, the University of Chicago group has found nine other hormonal compounds that can have similar effects unless they are normally disposed of in the body. The investigators believe that the liver usually serves as a monitor in preventing the hormonal by-products from producing body fever from day to day.

In clinical experiments, the scientists have produced intense fevers by injecting the following hormonal by-products in addition to etiocholanolone—all occurring in the human body:

From the ovary, pregnanolone, pregnandiol, pregnanedione; from the testis, etiocholanedione; from the adrenals, 11 hydroxy etiocholanolone, 11-keto pregnanolone, as well as the bile substances, lithocholic acid, ursodesoxycholic acid, and hyodesoxycholic acid.

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E FIELDS

POLITICAL SCIENCE

Space Office Created By State Department

➤ THE DEPARTMENT OF STATE has officially recognized outer space. It has established a special office to handle all international problems dealing with the space frontier, including man in space and returning from space.

The man in charge is Dr. Philip Farley, 44-year-old career officer, who has been designated to advise the Secretary of State and assist in formulating policy and action on the exploration, use and control of outer space. He also is responsible in the same areas for the peaceful uses of atomic energy and has the title of special assistant for atomic energy and outer space.

To prepare for the U. S. orbit of a man into space, Dr. Farley's office has negotiated agreements with a number of countries to assist in tracking and gathering radio data for the manned launch, still scheduled for some time this year.

Dr. Farley's office also is responsible for coordinating all Government activities, both civilian and military, concerned with international cooperation in the fields of atomic development and space.

While the office is newly established, space has had a place in the State Department for more than two years. However, recognition of the importance of this new dimension was marked by its establishment.

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DENTISTRY

Signing Petitions Urged To Prevent Tooth Decay

➤ SIGNING petitions for water fluoridation in the offices of dentists, physicians and pharmacists was advised as a substitute for referendums that would allow the addition of a minute amount of harmless fluoride in public drinking water to prevent decay.

The emotional atmosphere surrounding referendums on the subject "leads to unintentional as well as deliberate distortion of the facts," Dr. Stanley J. Buckman, biochemist of Memphis, Tenn., told the National Dental Health Conference in Chicago.

Dr. Donald R. McNeil, State Historical Society of Wisconsin, Madison, said that "politics rather than science" has taken over the fluoridation issue, and he urged a declaration of war against those who would deny the benefits of fluoridation to our children." He charged that "fluoridation has been wrested from the hands of the scientists and deposited squarely in the middle of the political arena."

The U. S. Public Health Service has estimated that the community lag in adopting fluoridation is depriving 40,000,000 children of protection from tooth decay and is costing the United States $452,000,000 a year in needless dental bills.

The American Dental Association has found that some 2,000 communities in the U. S. with a population of more than 38,000,000 persons have added fluoride compounds to their water.

Fluoride occurs naturally in some 1,900 communities with 7,000,000 inhabitants.

The American Medical Association as well as the ADA, the American School Health Association, the American Public Health Association, the National Institute of Municipal Law Officers, the Department of the Army and other organizations and agencies have approved fluoridation as a safe preventive of dental decay.

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GENERAL SCIENCE

Science Adviser Makes Recommendations

➤ THE SCIENCE ADVISER to the President is responsible for policy recommendations as well as scientific judgments, Dr. George B. Kistiakowsky, Science Adviser to former President Eisenhower, said at the annual meeting of the American Philosophical Society in Philadelphia.

During his tenure in the White House, Dr. Kistiakowsky was called upon for advice on national problems such as a Federal policy on food additives and issues related to nuclear testing and arms limitation, with their broad international implications.

Advice was given by Dr. Kistiakowsky on these matters after the technical and scientific background had been evaluated by the President's Science Advisory Committee.

For example, in considering the problems involved in a nuclear test ban agreement, the Science Committee would discuss and analyze the technical feasibility of a proposal, the possibilities of monitoring, whether the ban would affect the development of atomic weapons, and what sort of an organization would have to be established. On the basis of conclusions reached by the Committee, the Science Adviser would make his recommendations.

Before the establishment of the office of Science Adviser and the functioning of the Committee within the White House, policy makers in the Government had to rely largely on the advice of professional technically competent Government employees within their staffs. When problems affected more than one agency, the policy makers often were confronted with opposing advice from staffs of agencies involved.

It was this situation, Dr. Kistiakowsky said, that led the then President Eisenhower to create the post of Special Assistant for Science and Technology and to bring the Science Advisory Committee into the White House.

His aim was to obtain advice from technically competent persons not committed to any particular executive agency, thus bypassing the multi-layered staff of Government agencies, if necessary.

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ASTRONOMY

Model Star Burns at 630 Million Degrees

➤ A MODEL STAR, not the Hollywood type but the kind that becomes a red giant star in the center of galaxies, has been proved to burn at 630 million degrees Fahrenheit in the center.

The red giant stars have long been suspected of having a core of runaway heat processes inside them and this has now been confirmed in step-by-step computer calculations of helium burning in giant stars by Drs. R. Harm and M. Schwarzschild at Princeton University Observatory.

The scientists followed the development of the model star through its evolution when thermonuclear burning of helium begins. They found that 40% of the star was a core of helium with atoms stripped of their outer electrons and packed together to a million grams per cubic centimeter. A shell of burning hydrogen enclosed this helium core.

The helium burning sets in when temperature in the core reaches approximately 150 million degrees Fahrenheit. The helium burning becomes more and more rapid until the temperature reaches about 630 million degrees. At that time the core is releasing as much energy as is produced by ten million million suns, but none of it escapes from the star.

At such temperatures the star finally expands and the runaway climb in temperature stops. As the star expands it cools down and becomes a red giant. This process in the star is called a helium flash that lasts about 3,000 years, it is reported in the current issue of Sky and Telescope, 21:275, 1961.

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ASTRONOMY

Micrometeorite Showers Break Off Larger Meteor

➤ MICROMETEORITE showers raining down from the heavens are due to a large meteor breaking up when it enters the earth's atmosphere.

The disintegrating meteor causes the intense sparks and bright flare occasionally seen in the sky by eyewitnesses, Soviet Academician Dr. E. L. Krinov reports in the American Journal of Science, 259:391, 1961.

Fused crusts on tiny pieces of meteorites show that the meteors melted temporarily when they broke off from the larger meteor and later cooled, Dr. Krinov stated. Air currents in the atmosphere then spread the pieces over a large area where they eventually settled to the earth and became mixed with the soil.

All meteor showers will contain these tiny dust-like micrometeorites in addition to the larger fragments, Dr. Krinov said. The micrometeorites have all the main features of the larger meteorites.

Most scientists believe meteor showers occur when the earth's orbit passes through a concentration of tiny particles concentrated in space, possibly left by a comet.

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PUBLIC HEALTH

Cleaning Up the Nation's Waters

The world's richest and most technologically advanced nation is fouling its own nest and threatening the health of its people, Vincent Marteka reports.

➤ THE UNITED STATES is now at the crossroads in dealing with the water pollution problem. Positive action must soon be undertaken or it will become a major health problem for this and future generations.

New synthetic chemicals are now being flushed by industries into lakes and streams, killing fish and wildlife and threatening the health of many citizens. Radioactive poisoning is filtering bit by bit into the nation's water supplies, in quantities about which sanitation experts can only guess.

These new sources, which have appeared since World War II, add to the existing sources of water pollution such as sewage and industrial wastes that have been around much longer.

Present laws are inadequate to cope with the rising tide of water pollution. Congress has shown signs of changing the situation by introducing anti-pollution bills in both houses, each with a favorable chance for passage.

The water pollution problem, though acute, is aggravated by constantly increasing demands for water. With the exploding population and increasing thirst of new industrial processes, the United States is expected to double the amount of water now consumed within 20 years.

Quality Must Be Maintained

Already the wheels of industry, dry lawns and thirsty people consume more than 300 billion gallons a day.

This water "quantity" requirement can be met only if water "quality" is maintained, the U. S. Public Health Service emphasized recently.

Today metropolitan and industrial wastes contain increasing amounts of new types of synthetic chemicals that do not break down easily when treated. These chemical wastes, which were virtually unknown a few years ago, are now silently lurking in high concentration in several major streams. Little is known about the hardy chemical specks, and the question of poison (toxicity) is added to the age-old problems of typhoid fever and other water-borne diseases.

Radioactive poisoning is also rearing its ugly head in polluting U. S. waters. Serious contamination could occur (and did) from some uranium processing plants, but the major problem is probably how to get rid of the highly radioactive waste from nuclear power reactors. Many persons strongly fear the problem is the major hurdle to the widespread peaceful use of atomic energy.

The current method of sealing radiation waste in concrete containers and dumping it far out at sea is risky. No one really knows how long it would take before the concrete goes to pieces in seawater, nor whether the ocean currents would carry the dangerous material to heavily populated shores.

In order to fight water pollution on even ground, a national water resource program with water pollution control as a crucial point is needed in the U. S. More Federal aid for constructing city waste-treatment plants, more grants for state and interstate water pollution agencies, stricter enforcement of anti-pollution laws and an active research program on all levels of Government must be incorporated in the program.

These and other provisions are included in the anti-pollution bills introduced in Congress.

The present inadequate total national effort for water pollution research is less than $6,000,000 a year. Less than one-third is spent by the Government.

"It is obvious," Sen. Robert S. Kerr (D.-Okla.), outstanding conservationist, said acidly, "that a country spending over $1.5 billion per year on 'soap operas' and other forms of television and radio entertainment should invest much more than $6,000,000 annually to find out how to keep these fine new products of our soap factories and other chemicals from spoiling our drinking water."

More research on the little known new chemicals is a must in any water pollution program. The long range effect of the supposedly "safe" quantities of these various chemicals in drinking water might eventually prove dangerous.

Although the Public Health Service has already been studying the water pollution problem in its laboratories, the program is too inadequate to meet the present need, Dr. Luther L. Terry, Surgeon General of the U. S. Public Health Service, emphasized. He said research was urgently needed in such highly toxic industrial chemicals as a chlorinated insecticide that kills and litters fish along the shores if even present in such tiny amounts as one drop for every billion drops of water

Control Programs Inadequate

Although states have primary responsibility for water pollution control, their programs, with few exceptions, are entirely inadequate. Most states and municipal agencies either ignore the problem altogether, or else they have their hands tied because of limited funds and power. The agencies must be provided with sufficient funds and given more power to carry out the programs effectively.

Carl W. Buchheister, president of the National Audubon Society, stressed the need for Federal administration of the program. States are virtually powerless, he charged, in requiring private industry to install waste-treatment plants when confronted with industry's threats to move their plants (a source of state income) to another state

FISH KILL—Polluted waters killed thousands of fish and littered the shores of the Scioto River in Columbus, Ohio, the Forest Service found.

that would not be so demanding. Some industries have cooperated with health authorities by constantly using the same water over and over again. By recirculating water through its mills, a steel company in California reduced its water consumption from 65,000 gallons to 1,200 gallons per ton. However, the quality of water still must be maintained.

The nation's streams and lakes are sagging from the burden placed upon them to act as a disposal unit for industrial, agricultural and municipal wastes. So great is the demand, it seems at times as if the "conquest of outer space might eventually become a necessity for survival rather than a pawn for prestige."

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GENERAL SCIENCE

News From Science Clubs

➤ SCIENCE CLUB PROGRAMS reported to Science Clubs of America are full of new and stimulating ideas. Some interesting activities, chosen at random from the files, include:

LAST SUMMER the members of the Alpha Zeta Club of Parkway Junior-Senior High School, Chesterfield, Mo., took a week-long field trip to a State Park to collect data for the club's project, the ecology of a wooded area. They spent a fall weekend in another State Park gathering additional information. Last year's project on the ecology of a pond, which won the club a $50 award at the Greater St. Louis Science Fair, is now on display at Rockwoods Reservation.

THE Alaska Polaris Science Club, sponsored by Carpet Masters, Inc., Anchorage, Alaska, reports that its most effective programs have included a chemical magic show, demonstrations by members of various experiments, plant study during field trips and instruction from older members in electricity and chemistry.

POPULAR ACTIVITIES of the Candler Science Club of Candler (N. C.) Elementary School, have been a trip to a pottery, followed by making and firing their own ceramics; a trip to see an 80-year-old locomotive used for bringing logs out of the woods; microscope work; a home-made rocket; a nature hike and an intercom constructed from an electronics kit.

THE SCIENCE CLUB at The Grammar School, Holywell, Flintshire, England, has been cooperating with Manchester University in the exploration of space by radio-telescope. Two of the boys adjust the small companion aerial to Jodrell Bank as instructed by Prof. Lovell's team. Their sponsor, J. Roughley, senior physics master at the school, stirs their enthusiasm for physics by giving them some of his humorous verse. A small sample goes like this:

Mass and Weight

When we're at school we learn to state
That objects have both mass and weight.
But what's the difference, you'll agree,
For anyone is hard to see. . . .
Now mass for mass has an attraction,
From whence a force springs into action;
And earth's the biggest mass you see!
Its pull, the force of gravity! . . .
'Tis simply known today as "g"
The mightiest force that e'er will be!
And though you may not land in clover,
Your friends will say, "That's him—all over!"

IN WAKEFIELD, Mass., the General Science Club at Wakefield Junior High School is planning programs which it will produce for elementary students.

THE MAGAZINE RACK at Argyle (Iowa) High School was the subject of a special report made to the school by the Argyle High School Science Club. The club's report induced the school administration to subscribe to four new science magazines.

THE CRUSADER Science Club, Central Catholic High School, Canton, Ohio, put on a science exposition called "Sciera-ma." This club reports that its most effective programs center around individual projects of the members.

IN MADISON, Wis., the Shawe Science Club, Shawe High School, has a six-page mimeographed report on the construction of a bi-stable transistor flip-flop unit for a computor, which they will send to interested clubs or individuals on request and upon receipt of 8¢ in stamps. The club also has been producing and selling at cost its own "Chemi-Light" to be used for chemiluminescence experiments.

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MEDICINE

Advise Cancer Research With Whole Smoke

➤ FURTHER EFFORTS are needed to find out whether lung cancer can be produced in animal tissue by applying "whole" smoke instead of by artificially prepared condensates of smoke, Dr. Clarence Cook Little, scientific director of the Tobacco Industry Research Committee, has proposed.

In his 1960 annual report Dr. Little said that the "causation theory of smoking in lung cancer, heart disease and other ailments" is without clinical or experimental proof.

Other suggestions by Dr. Little:

Medical researchers should obtain information through direct medical examination instead of by questionnaire. They should collect information on personal characteristics and habits other than smoking.

They should approve and agree upon methods of classifying the major types of lung cancer to make studies more meaningful. Some reports have associated smoking with one type of lung cancer only.

More than 135 research reports have been published since the first tobacco industry research grants were made in 1954. New research money appropriated for 1961 brings the total to $4,650,000.

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• Books of the Week •

For the editorial information of our readers, books received for review are listed. For convenient purchase of any U. S. book in print, send a remittance to cover retail price (postage will be paid) to Book Department, Science Service, 1719 N Street, N.W., Washington 6, D. C.

ABC's OF RADAR—Alan Andrews—*Bobbs*, 112 p., illus., paper, $1.95. Tells how radar works and describes its many modern applications.

ADVANCES IN THE ASTRONAUTICAL SCIENCES, Vol. 6: Proceedings of the Sixth Annual Meeting of the American Astronautical Society, 1960—Horace Jacobs and Eric Burgess, Eds.—*Macmillan*, 898 p., illus., $25. Major subjects covered are communication in space, propulsion, guidance, space medicine, problems of re-entry and upper atmosphere physics.

THE AUTOMOBILE TRANSMISSION AND DRIVE LINE—James S. McGrath—*Chilton*, 376 p., illus., $7.95. Textbooks for the use of vocational-technical educators.

THE BOOK OF SCIENTIFIC DISCOVERY: How Science Has Aided Human Welfare—D. M. Turner, foreword by Charles Singer—*Barnes & Noble*, 3rd rev. ed., 301 p., illus., paper, $1.75. Outlines for the general reader the origin and growth of some parts of our present scientific knowledge.

A BOOK TO BEGIN ON EXPLORERS—Leslie Waller—*Holt, Rinehart & Winston*, unpaged, illus. by Gil Miret, $2.50. For the youngest readers, with lively illustrations.

CAREERS IN ENGINEERING, MATHEMATICS, SCIENCE AND RELATED FIELDS: A Selected Bibliography—A. Neal Shedd, Anita K. Scott, and James M. McCullough—*Office of Education (GPO)*, 39 p., paper, 25¢. Describes 285 titles of free and inexpensive career information.

CATERPILLARS—Dorothy Sterling—*Doubleday*, 64 p., illus., by Winifred Lubell, $2.75. Tells young readers how caterpillars change into moths and butterflies.

CELL FUNCTION: An Introduction to the Physiology of the Cell and Its Role in the Intact Organism—L. L. Langley—*Reinhold*, 377 p., illus., $7.50. Introductory text to a few of the basic principles governing living processes.

THE CHANGING YEARS: The Menopause Without Fear—Madeline Gray—*Doubleday*, rev. ed., 273 p., paper, 95¢. Presents for women the latest medical findings, based on interviews with many doctors.

COERCIVE PERSUASION: A Socio-Psychological Analysis of the "Brainwashing" of American Civilian Prisoners by the Chinese Communists—Edgar H. Schein with Inge Schneier and Curtis H. Barker—*Norton*, 320 p., $6.75. Analyzes the experiences of a number of American civilians who were imprisoned in Red China and are alleged to have made confessions of a politically damaging nature.

THE CONQUEST OF PAIN: Achievements of Modern Anaesthesia—Ronald Woolmer—*Knopf*, 247 p., illus., $4.50. Anaesthesiologist presents for the layman the latest achievements in the conquest of pain inside the operating room and out.

THE CONSULTING ENGINEER—C. Maxwell Stanley—*Wiley*, 258 p., $5.95. Presents the professional and management problems involved in the practice of consulting engineering.

THE CURIES AND RADIUM—Elizabeth Rubin—*Watts, F.*, 112 p., illus. by Alan Moyler, $1.95. Juvenile biography of Pierre and Marie Curie.

DARWIN'S PLACE IN HISTORY—C. D. Darlington—*Macmillan*, 110 p., $2. Essay on the issues that matter most in the work of Darwin, of their origins before his time and of their effects today.

ELEMENTARY CONCEPTS OF TOPOLOGY—Paul Alexandroff, preface of David Hilbert, transl. from German by Alan E. Farley—*Dover*, 74 p., illus., paper, $1. Unabridged translation of book first published in 1932.

ELEMENTARY HUMAN PHYSIOLOGY: Laboratory and Demonstration Manual—A. B. Taylor and Frederick Sargent, II—*Burgess*, 104 p., illus., paper, $2.75. Series of experiments planned for a one semester course.

THE FAMILY HANDBOOK OF HOME NURSING AND MEDICAL CARE—I. J. Rossman and Doris R. Schwartz—*Doubleday*, 519 p., illus., paper, $1.45. Reprint of 1958 reference book on what to do for the patient after the doctor is gone.

FIELD COMPUTATIONS IN ENGINEERING & PHYSICS—A. Thom and C. J. Apelt—*Van Nostrand*, 165 p., $5.75. A faster, more versatile squaring method of obtaining numerical solutions to partial differential equations in two dimensions.

FIVE LITTLE STORIES—William W. Strader—*Nat. Council of Teachers of Mathematics*, 16 p., illus., paper, 50¢. Interesting facts about mathematics for young people.

FOOD, LAND AND MANPOWER IN WESTERN EUROPE—P. Lamartine Yates—*Macmillan*, 294 p., $7. European survey attempting to measure and project future trends in growth of population, labor productivity, consumption goods and government services both for Western Europe as a whole and for each of the 18 non-Communist countries.

THE FOREST SERVICE ENGINEER: Your Gateway to the Future—*USDA (GPO)*, 32 p., illus., paper, 30¢. Career information for young people.

FRAME ANALYSIS—Arthur S. Hall and Ronald W. Woodhead—*Wiley*, 247 p., $8.50. Offers principles of both flexibility analysis and stiffness analysis in one unifying treatment of the mathematical analysis of structural frames.

FROM EVEREST TO THE SOUTH POLE—George Lowe—*St. Martins*, 216 p., photographs by author, $4.50. Account of the 1956 Trans-Antarctic Expedition as seen and experienced by the expedition's photographer.

GALAXIES—Harlow Shapley—*Harvard Univ. Press*, rev. ed., 186 p., illus., $5. Selected for its lasting significance, this revision presents up-to-date material on galactic explorations, star clouds of Magellan, cepheids, the Milky Way and neighboring galaxies, the metagalaxy, and the expanding universe.

GALILEO AND EXPERIMENTAL SCIENCE—Rebecca B. Marcus—*Watts, F.*, 134 p., illus. by Richard Mayhew, $1.95. Juvenile biography.

THE HAZARDS TO MAN OF NUCLEAR AND ALLIED RADIATIONS: A Second Report to the Medical Research Council—Sir Harold Himsworth, Chmn—*Her Majesty's Stationery Office (British Information Services)*, 154 p., paper, $1.35. British official data on fallout, its biological effects, and levels of radiation.

HOUSEHOLD DECISION-MAKING—Nelson N. Foote, Ed.—*N. Y. Univ. Press*, 349 p., $6.50. Studies and discussions of family behavior re-

garding decisions about saving, spending and selecting.

How to Clean Everything: An Encyclopedia of What to Use and How to Use It—Alma Chestnut Moore—*Simon & Schuster*, rev. ed., 203 p., illus., $3.75. Has alphabetized section on how to remove stains from fabrics.

How to Know the Ferns: A Guide to the Names, Haunts and Habits of Our Common Ferns—Frances Theodora Parsons—*Dover*, 2nd ed., 215 p., illus. by Marion Satterlee and Alice Josephine Smith, paper, $1.25. Unabridged reprint of 1899 edition.

How to Master Your Allergy—Harry Swartz, M.D.—*Nelson*, 288 p., $5. Book concentrates on minimizing or avoiding allergic difficulty through preventive program.

Human Anatomy Atlas—Ronald Keller in consultation with Christian A. Hovde—*Hammond*, 36 p., color illus., $1. Depicts component parts of both the female and male anatomy.

The Theory and Operation of the Slide Rule—John P. Ellis—*Dover*, 289 p., paper, $1.50. Presentation emphasizes the fundamental theory upon which slide rule operation is based.

Vacations Abroad: Courses, Study Tours, Work Camps, 1961—UNESCO—*Unesco Publications Center (N.Y.)*, 13th ed., paper, $1.25. Reports on wide variety of educational and cultural vacation activities in more than 75 countries, including information on financial assistance available.

Weed Identification and Control: In the North Central States—Duane Isely—*Iowa State Univ. Press*, 2nd ed., 400 p., illus. by Frances Fenske, $4.95. Methods for determining unknown weeds, basic principles of weed control and recent advances in herbicidal weed control.

What to Tell Your Children About Sex—Child Study Association of America, Adie Suehsdorf, Ed.—*Arco*, 96 p., illus. by Harry Rosenbaum, $1.50. Tells parents simply and plainly, in question-and-answer form, how to impart sex information at the various stages of child development, from infancy to adolescence.

The World of Dinosaurs—Edwin H. Colbert—*Home Lib. Press*, 34 p., illus. by George Geygan, 69¢. An introduction to prehistoric animals.

INVENTION

Patents of the Week

A device to cut down air pollution has been patented. A solar cell for converting the sun's energy into electricity and a television antenna system were other inventions.

▶ AN ANTISMOG DEVICE to cut down air pollution has been patented.

A Los Angeles citizen became fed up with the auto exhaust gases that cause smog in his city 200 days a year and decided to take matters into his own hands. John Allen Buttler invented a combination muffler and afterburner (patent No. 2,981,057) that burns the harmful hydrocarbons before they are emitted into the atmosphere.

The muffler has a cage-like structure of heating rods and baffle screens. The rods are heated by a power line connected to the car's electrical system and the screens dampen the noise.

In order to ignite the hydrocarbons, a valve is shut when the automobile is started, trapping hydrocarbons in the muffler. A current is sent through the rods which generate enough heat to burn the hydrocarbons.

After a while, the baffle screen and a ceramic liner inside the muffler begin to glow and the current is then shut off and the valve opened. The glowing elements are sufficient to burn all hydrocarbons generated while the vehicle is moving.

A solar cell that converts the sun's energy into electricity won patent No. 2,981,777 for Donald C. Reynolds of Springfield, Ohio, who assigned patent rights to the U. S. Air Force. The surface receiving the sun's rays is polished and coated with a cadmium sulfide layer.

A TV antenna system that blocks out signals causing interference on the television set received patent No. 2,981,834. The system has an antenna that seeks out the unwanted signals and cancels them out, while another antenna receives the normal signals, inventors Rollind O. Holloway and John R. Holloway of Hollywood, Fla., stated. A similar system for radios is also covered by the patent. A sharp stiletto to be used by skin divers swimming through dangerous murky ocean depths was invented by Californian Edwin J. Wedrall of La Habra. The weapon, which received patent No. 2,981,026, can be used for protection against underwater creatures, or for spearing fish. A pressurized can of carbon dioxide housed in the handles releases the gas upon spearing a fish, making the animal lighter so it floats to the surface.

A lightweight portable prompting system helps actors and speakers deliver their speeches or dialogue before television cameras or live audiences. Invented by Joseph Florian De Frenes of Springfield, Pa., and Horace Ludington Roberts of Port Chester, N. Y. (Contoocook, N. H.), the prompter received patent No. 2,981,144. The text, which is written on a strip of material, is presented to the speaker at a rate controlled by a tiny motor. The strip is threaded through a magnifying unit, providing easy visibility for the speaker.

The device can also be used in foreign language classes, the two inventors stated.

A method for eliminating termites from homes supposedly can get into every crevice where the insects are hiding. Inventor Billy J. Woodson of Colton, Calif., was awarded patent No. 2,981,025 for the invention. A pipe peppered with tiny openings for spraying the anti-termite poison is designed for easy handling.

A scissor-like device, patent No. 2,980,995, for pruning or cutting shrubs and tree limbs was patented by Lendon W. Booth of Memphis, Tenn. No motion is wasted, the inventor stated, for the pruner cuts both on the forward and the backward stroke. Two circular plates with sharp teeth provide the cutting edge.

SOCIOLOGY

Adolescent Drinkers Have Drinking Parents

➤ THE WEAKNESS of alcoholic parents is suggested as one of the reasons for adolescent problem drinking. By proving their ability to drink successfully in contrast to the way their parents drink, the youngsters are asserting their independence.

Seventeen boys and three girls treated under the auspices of the Peter Bent Brigham Hospital Alcoholism Clinic and the Massachusetts Youth Service Board said they had a vivid recollection of their first drink.

In every case the young drinkers' personalities were marked by hostility, depression, impulsiveness and sexual confusion, and the majority had been in schools for delinquents. The fathers of most were alcoholic and in some cases, the mothers also.

The report is made by James R. MacKay, executive director, division of alcoholism, New Hampshire Department of Health, Concord, N. H., in the Quarterly Journal of Studies on Alcohol, March, 1961.

• Science News Letter, 79:302 May 13, 1961

METEOROLOGY

Glacier Reflects Canada's Climate

➤ A GLACIER inching its way down mountainsides in western Canada is probably reflecting the changing climate in that region.

The Commander Glacier nestled in the high mountains of British Columbia has advanced about 800 feet since 1954. The advance is probably due to Canada's increased snowfall and cooler climate during the last 15 years, Dr. Robert West of the University of Wisconsin and Arthur Maki of the National Bureau of Standards, Washington, D. C., report in Science, 133:1361, 1961.

Although glacial advances were recently recorded in mountains of western United States, the Commander Glacier is the first reported in the highly remote and hard-to-get-at mountains in British Columbia. The western Canadian province has the highest mountain ranges in Canada.

• Science News Letter, 79:302 May 13, 1961

TECHNOLOGY

Space Age Spinning Makes Multi-Wire Cable

See Front Cover

➤ THE SPINNING WHEEL, seen on the cover of this week's SCIENCE NEWS LETTER, turns out multi-wired cables for missile and satellite launch pads. It is part of a 25-foot wire-stranding machine that has produced more than five miles of cable in a year.

The wheel turns up to 60 revolutions a minute. It is operated at the Lockheed Missiles and Space Division at Van Nuys, Calif.

• Science News Letter, 79:302 May 13, 1961

GEOPHYSICS

Earth Has Crown Of Invisible Light

▶ EARTH WEARS a crown of invisible light.

It is an envelope of extremely faint luminous gas which apparently completely surrounds the globe at altitudes between about 180 and 600 miles. The invisible light can be seen only with special instruments.

The crown has now been demonstrated, Dr. Herbert Friedman of the Naval Research Laboratory, Washington, said, to be composed of hydrogen gas whose atoms scatter solar radiation in the so-called Lyman-alpha spectrum, a part of the invisible ultraviolet. It is not yet known whether this hydrogen comes from the earth's surface or is gathered from space, Dr. Friedman told a conference sponsored by the Office of Naval Research at the U.S. Naval Academy in Annapolis, Md.

As is the case of the solar corona relative to the sun's surface, Dr. Friedman said, the temperature of this gaseous envelope of the earth is very high when compared to the surface temperature, somewhere between 1,470 degrees and 3,810 degrees Fahrenheit. Investigations indicate that above an altitude of about 60 miles the hydrogen content of the atmosphere is about three million million atoms per square centimeter column reaching to the top of the atmosphere. This is very nearly a vacuum by surface standards.

In some of the latest rocket experiments, Dr. Friedman reported, records of the short wave ultraviolet radiations have been obtained over an altitude range from 210 to 730 miles. The test shows that the overhead brightness decreases quite rapidly with altitude, the intensity at 600 miles being about 80% of that at 180 miles.

This tends to indicate an earthly origin for the hydrogen. However, Dr. Friedman said, whether this terrestrially scattered component is a major fraction of the Lyman-alpha spectrum observed at night only can be ascertained by conducting experiments at still higher altitudes. One such experiment is planned for a future deep space probe with a Lyman-alpha telescope to scan the vicinity of the earth.

• Science News Letter, 79:303 May 13, 1961

Questions

ASTRONAUTICS—How large is the parachute on the Mercury space capsule? p. 290.

BIOLOGY—In what type of protein was a new amino acid found? p. 294.

Photographs: Cover, Lockheed Missiles and Space Division; p. 290, National Aeronautics and Space Administration; p. 291, North American Aviation, Inc.; p. 293, National Society for Crippled Children and Adults; p. 295, Oliver Corporation; p. 298, U. S. Forest Service; p. 304, Leslie Creations, Inc.

New Ideas and Gadgets

For sources of more information on new things described, send a self-addressed stamped envelope to SCIENCE NEWS LETTER, 1719 N St., N.W., Washington 6, D. C., and ask for Gadget Bulletin 1091. To receive this Gadget Bulletin without special request each week, remit $1.50 for one year's subscription.

TRANSISTOR RADIO, with all-American components, weighs only five ounces. It has six matched transistors and two germanium crystal diodes, a plug-in jack for earphone, and operates from a specially designed 9-volt battery. The shirt pocket radio develops 250 milliwatts of power.

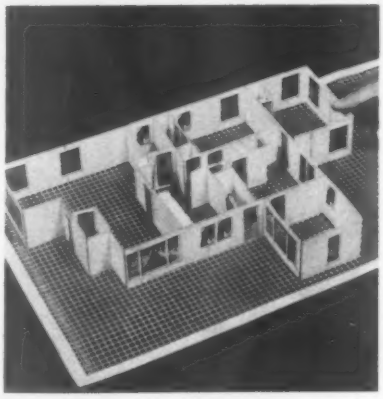
• Science News Letter, 79:304 May 13, 1961

WALL PAINT that does not drip, run or spatter is an extra-thick acrylic-type emulsion. It flows into a smooth, flat-finish coating as it is brushed or rolled on. With a consistency like that of mayonnaise, the paint needs no stirring, dries in 30 minutes, and is highly washable. Painting tools are readily cleaned with water.

• Science News Letter, 79:304 May 13, 1961

FISHHOOK DISGORGER makes the chore of removing hooks from fishes' gullets simple and virtually bloodless without damage to popping flies and bugs. Made of polypropylene plastic, the floating instrument retains its shape even after twisting and bending.

• Science News Letter, 79:304 May 13, 1961



HOME-BUILDING KIT, shown in the photograph, contains dozens of fiber partitions, doors, windows and kitchen cabinets, all made to one-quarter-inch scale, same as blueprints, to help in planning the building of a new home or remodeling of an old one. Kit, for single- or multiple-story planning, includes 65-page handbook to help estimate costs.

• Science News Letter, 79:304 May 13, 1961

COLLAPSIBLE KEY RING separates three ways automatically for ease of key selection. Precision made of alloys, the ring is tangle-proof and carries a lifetime guarantee.

• Science News Letter, 79:304 May 13, 1961

NYLON SEWING THREAD, so strong it defies breaking by hand, has special bonding agent, giving the thread a slight stiffness for easy threading. Available in 18 colors, thread may be used for same purposes as any six-cord cotton thread.

• Science News Letter, 79:304 May 13, 1961

AUTOMATIC LETTER OPENER cuts the edge of envelopes safely with razor-edge precision without damage to contents. Simply insert end of envelope in slot, press bar, and it is neatly opened. Weighing only three pounds, the opener is small enough for desk use.

• Science News Letter, 79:304 May 13, 1961

TYPEWRITER CLEANER is an 8½-by-11-inch sheet of velvety, fibrous material that is neat and safe to use. The sheet is rolled into the typewriter, which is placed on stencil, then each key is struck firmly three or four times to allow finger-like fibers to loosen dirt or ink. Adhesive at the base of sheet pulls out soil. Sheets come three to a pack, each sheet perforated in seven sections, providing 21 cleanings.

• Science News Letter, 79:304 May 13, 1961

Nature Ramblings

➤ IN MID-MAY, forest fringes, wooded pastures and prairie timber belts blossom forth with masses of delicate pink, single trees standing out like huge roseate popcorn balls. These are the native wild crabapple trees, and it is by no small effort that they have grown to such beautiful proportions.

Wild crabapples growing in pastures pass through a strange metamorphosis before they reach full size and achieve the symmetrical, rounded shape typical of the species.

When the seedling tree comes up, a cow promptly bites off the top. The seedling branches, and a cow bites it off again.

The little plant grows into a compact, somewhat thorny bush, constantly gnawed by cattle, growing thorny and throwing out longer, lower branches, until at last it can hold off its browsing enemies at neck's length.

By now it has become pyramid-shaped. Then a tall shot springs up from the tip of the pyramid, beyond reach of the cattle, and grows rapidly upward, branching as it climbs. The cattle nibble off some of these branches and trim this upper part into a second pyramid, inverted over the first, converting the growing tree into a big green hourglass.

Wild Crabapples

Finally the top expands and rounds out, and the straggling branches beneath die and break off. In any pasture one can find crabapples in all stages of this evolution.

For all their spring beauty, both of the principal native crabapple species bear bitter fruits. Notable for their high tannin content, the tough, hard apples are puckery even when they ripen in autumn.

• Science News Letter, 79:304 May 13, 1961

Do You Know?

A recent scientific study showed that although average children in the eighth grade can do *arithmetic* taught in elementary school, only 15% actually understand it.

Death occurs for 30% to 40% of the people attacked by *sharks*.

The lifetime quota of *water* usage for the average person in the U.S. is some 3,500,000 gallons.

Future historians may note that the revolution in *computers* now underway had as great an impact on human society as the industrial revolution of the 18th and 19th centuries.

Tornadoes killed 42 persons and injured 703 in the United States during 1960.

A cloud-scraping *television* tower rising 1,428 feet above the Texas plains near Dallas is also doing double duty as the world's tallest known weather research structure.

• Science News Letter, 79:304 May 13, 1961